A SURVEY OF THE INDUSTRIAL ARTS PROGRAMS IN THE SEPARATE SCHOOLS OF OKLAHOMA AND A PROPOSED PROGRAM FOR THESE SCHOOLS

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CHAPTER I

A STATEMENT OF THE IMPLICATIONS AND EXTENT OF THE PROBLEM

Industrial training has been carried on in some form or other since the time of primitive man. Every age and time has known some type of industrial arts. The movement for formal instruction is thought to have originated in German pedagogy.[1] But the first definite steps taken to make this training a part of the educational plan were made by Uno Cygnaeus who believed training in the arts and crafts should be an integral part of a well-rounded elementary school program.[2]

Before these processes and constructional methods could be taught in the schools, it was recognized that there must be some method of analysis and of arrangement of these methods into a pedagogical order. This task remained to be completed by Della Vos who with his associates devised a simple plan of organization which made instruction in the mechanical arts both practicable and possible.

Vocational education which includes industrial education is no new procedure in school programs. Very early in the development of industrial training in America, that method was chosen as a practical and economical means of aiding the children of ex-slaves in preparing themselves for economic

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[1] Charles A. Bennett, History of Manual and Industrial Education up to 1870, p. 69.

[2] Ibid., pp. 71-72.

independence. At the present time, many Negro students look to the manual arts as the answer to an urgent problem of adaptability to a highly industrialized society. Only through training in industrial arts education can the desired ends be realized.

In the state of Oklahoma, as elsewhere, there are several agencies which shoulder the responsibility of administering this training. The high schools, night schools, trade schools and the state college share this duty. There are 66 Negro high schools in Oklahoma, 50 of which offer some type of training in industrial arts. These industrial arts programs furnish the basis for this study.

The Problem. The importance of training students in the industrial arts has been realized and appreciated for as long as schools for Negro pupils have been established. But funds have not been made available for any such training in many of the smaller schools. Greater interest has been manifested in the manual skills wherever these skills are taught for the practicality of the knowledge has made it outstanding in student appeal. The success of the programs in use brought about the realization that industrial arts training should be made available in every high school in the state.

As is stated elsewhere in this writing, the question of finance has always been a grave one in the separate

schools. Tools and equipment needed to teach industrial arts are costly and in many instances the school budget will not warrant the added expense. State aid has been the answer to this need in many of the larger schools but many smaller schools must wait to become eligible to receive this assistance before adding industrial arts to the present program.

Of the 50 industrial arts programs under consideration by this writer, it was found that more than one half of them were established in the last 15 years. From the writer's experience and knowledge, it is known that many of these programs were set up under conditions far from ideal. Lack of necessary equipment and insufficient space for operation are problems for which the solution lies beyond the scope of this study. Rather, this writer is concerned with a plan for the improvement of the programs now in existence. Many of the high school graduates will go on to college. Many others will not have this opportunity to continue this training and will seek a means of livelihood in the community. How industrial arts can best serve the interests of both groups is the problem with which the writer is concerned. This idea resulted from discussion with Dr. DeWitt Hunt, Head of the Department of Industrial Arts and Engineering Shopwork, Oklahoma Agricultural and Mechanical College, who served as adviser for this writer when this thesis had its origin. It was decided that a subject for the thesis would be: A Survey

of Industrial Arts Programs in the Separate Schools of Oklahoma and a Proposed Program for these Schools.

Delimitations. The purpose of this study is to use the material gathered as a basis for a proposed program of industrial arts which could be used in the separate schools in Oklahoma. As the title states, this survey includes only the separate schools of Oklahoma. It concerns industrial arts primarily. For this reason, only those high schools which have industrial arts programs are included. An attempt was made to reach every high school with an industrial arts program no matter how limited, but this effort did not prove completely successful.

Techniques Used. The first method of securing the needed information that presented itself was the questionnaire method. Misuse of the questionnaire method has caused considerable criticism of this method. Further investigation of this technique reveals that the questionnaire still has its advocates. One writer defends its use by saying:

> Although the questionnaire method of securing information and of conducting research has probably been overworked and abused during recent years, the fact remains that there are some types of problems . . . that cannot be attacked except by the means of a questionnaire. The questionnaire cannot and should not be abolished; but, it should be more intelligently used than is now the case . . .[3]

Another writer agrees that the questionnaire is of value only if the following errors are avoided:

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[3] Ward G. Reeder, How To Write A Thesis, p. 63.

> Perhaps the most devastating practice is the request for information which is available in other sources. Second, the sheer length of the responses often expected tends to discourage the busy recipient. Third, the failure to arouse any motive to answer may be mentioned. Fourth, may be mentioned the frequent inclusion of questions of apparent unimportance. . . As a final deficiency may be mentioned the common occurrence in questionnaires of equivocal questions.[4]

The information asked for in the questionnaire used in this study was not available in other sources. The impossibility of personal investigation was at once apparent. The writer did have the opportunity to visit the shops in eight of the high schools included in the survey. It was decided, therefore, that the questionnaire method of collecting data be used. Other material used was obtained from library sources. Information upon which the shop plan and the program of activities were based came from extensive survey of magazine articles, textbooks in shopwork and industrial subjects and from interviews, personal experiences and judgment.

Reviews of Similar Studies. It is doubtful if any other research study concerning itself with the industrial arts programs for the separate schools of Oklahoma has been made. If so, this writer has been unable to find that information. Holtzclaw made a study of the historical background of Negro education in Oklahoma.[5] In 1940, Washington[6] made a similar study dealing with the development of

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4 Harold H. Abelson, The Art of Educational Research, p. 72.

5 Nell Holtzclaw, History of Negro Education in Oklahoma.

6 Nathaniel Washington, Historical Development of the Negro in Oklahoma.

Both of these studies were helpful in the writing of this thesis. In 1942, Francis Harris prepared, by means of interview, a study of the industrial arts programs in four Negro high schools then accredited by the North Central Association.[7] While this study may appear similar in nature to the problem being studied by this writer, closer observation reveals that the restricted area to which that study was confined and the fact that no program was proposed made it almost completely dissimilar.

Outcomes to be Expected. The knowledge and experiences gained by others should always prove helpful to one who plans to follow a similar line of work. The returns of this survey plus personal experiences and information gained from other sources will serve as a basis on which to formulate an industrial arts program for the separate schools in Oklahoma. This program includes:

1. Courses of study for five shop subjects.
2. A plan for a suitable shop building.
3. Suggested lists of equipment necessary for carrying on the program.

At the conclusion of this study, some recommendations are made. Progress now being made in the separate schools may mean that the recommendations may soon be realized.

Uses of Outcomes. As has been mentioned elsewhere in

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[7] Francis H. Harris, Industrial Arts in the North Central Association Negro Schools in Oklahoma.

this chapter, there are two groups of boys to be considered in the industrial arts training program. The first group is composed of boys who will go on to college and prepare themselves for a professional occupation. The second group is made up of those boys who need training that will enable them to enter the trades upon completion of high school training. This industrial arts education program has been planned, therefore, with two objectives in view:

1. To provide a course of training for the first group which will expose them to the widest variety of experiences possible so as to develop a knowledge of trade training and to furnish a basis of selectivity of specific endeavor.
2. To provide for the second group industrial arts training which will aid them in entering trades as semi-skilled workers upon leaving high school.

Since upon request a summary of the findings of this survey will be mailed to each person who answered the questionnaire, this work may be of value to those who desire to improve the program now in use, and to those who find it their responsibility to organize the industrial arts program when it is being introduced into a new situation.

Conclusion. In this chapter, the writer has indicated the nature of this study and the reason for undertaking it. The methods used have been discussed, the uses for the knowledge gained indicated, and the outcomes predicted. Before

considering the survey and proposed program, an effort will be made to present an idea of the writer's philosophy of education and a picture of the historical background of industrial arts education in the separate schools.

CHAPTER II

THE PHILOSOPHICAL APPROACH

Industrial arts is a part of general education. It is necessary, however, to explain certain of its terms, functions, and practices to clarify concepts concerning its relationship to the general education field. The assumption is made that industrial arts is not a special subject, but an integral part of the general education program. For this reason, the aims of general education must be discussed and an explanation given of the contributions made by industrial arts to the attainment of these aims.

A. DEFINITIONS OF TERMS USED

Education. Some attempts to define education have taken the form of a statement of purposes or aims. In this manner, Spencer[1] defined it as "preparation for complete living". Others have attempted its definition in more concrete terms. Struck[2] called it "the acquisition of knowledges and skills that are useful for general living". For the purposes of this paper, education is interpreted as growth and development through experiences.

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[1] Herbert Spencer, Education: Intellectual, Moral and Physical, p. 9.

[2] Theodore Struck, Vocational Education for a Changing World, p. 5.

Industrial Arts. According to Bonser and Mossman[3], industrial arts is a "study of the changes made by man in the forms of materials to increase their values and of the problems of life related to these changes". Fales[4] defines industrial arts as the "broad study of the materials, tools, products, organization, processes, jobs and human problems of industry". The Industrial Arts Policy Bulletin of the Oklahoma Policies Commission defines industrial arts as a "group of school subjects that deal with industry and with the effects of industrial development on the home and social life of the individual, and with the manipulative processes of industrial materials which have become an essential part of the social culture". These definitions are designed to convey an idea of the scope and potentialities of this comparatively new field of education.

Related Terms. There are other terms closely related to this field which, in their definition, lend a clearer meaning to the term "industrial arts". First of these is Industrial Education, which is defined by Friese[5] as "all courses of instruction concerned with modern industry, its raw materials, products, machines, personnel and problems". Manual Training, which is next on the list of correlative

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3 F. G. Bonser and Lois Mossman, Industrial Arts for Elementary Schools, p. 5.

4 Roy Fales, Industrial Arts, Tentative Syllabus in Comprehensive General Shop, p. 3.

5 Friese, John F., Course-Making in Industrial Education, p. 12.

terms is defined by Bollinger[6] as " a historical term used to describe a form of school shop work offered for general educational purposes". And, third is Vocational Education, which is defined by Struck[7] as "those knowledges and skills which fit an individual, wholly or in part for a definite occupation, the pursuit of which equips him for successful living".

Other Related Terms. There are other terms used in this writing which deserve definition. Among these are: (1) Survey, a critical inspection of an area with regard to certain conditions; (2) General Shop, a shop in which activities in two or more industrial areas are carried on at the same time; and, (3) Course of Study, a unit of instruction used in a specific situation. These terms refer to areas of investigation treated in this writing.

B. A STATEMENT OF PHILOSOPHY

The Democratic Ideal. A basic consideration of the American way of life is the fact that it is democratic. This fact explains, coordinates and makes significant most of the features typical of American civilization. A democratic nation must have democratic schools in order to transmit this way of life to coming generations. Since

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6 J. W. Bollinger, Elementary Wrought Iron, p. 1

7 Struck, op. cit., p. 5.

democracy is transmitted by the schools, the writer believes, then, that the schools should provide an environment where students have the opportunity to think independently and to discover their own abilities. The school should furnish only that guidance necessary to develop the student's own techniques. The school should provide, also, continuous experiences which will result in better self-direction and in integration of personality. Emphasis on individual development should be the aim of democratic education.

Pupil Participation in the Democratic Plan. Only in a democracy is there a recognition of the worth of the individual and freedom of any person to develop this individuality to its fullest potentialities. However, this freedom of the individual carries with it the fostering of traits such as tolerance and cooperation. Psychology has revealed that an individual not only learns lessons but develops attitudes and emotional reactions as well. It reveals, too, that learning takes place more quickly and easily when that learning is the result of experiences carried on in relationship to pupil goals and purposes. The schools, then, should furnish the experiences necessary for the students to learn through activity the lessons which prepare them for life and the values which they need to live as adults in a democratic society.

C. THE ROLE OF INDUSTRIAL ARTS IN A DEMOCRATIC SOCIETY

Since the Civil War period, there has been a steady

growth in industrial development in America. New inventions, increased demands and accumulation of capital within the country have caused this democratic society to become highly industrialized. The results of rapid industrialization have brought about a need for new emphasis in the schools. Since education aims to transmit social culture, then the vital place of industry in American life should call for added stress on phases of the program which deals with its instruction in the schools.

The Objectives of Industrial Arts. Each of the various subjects within the curriculum of the school has its own specific objectives. The subject of industrial arts is no exception. The objectives of industrial arts as listed by one writer are as follows:

1. To develop recreational and avocational activity.
2. To increase appreciation for craftsmanship and design.
3. To increase consumer knowledge.
4. To provide experiences which help in choice of vocations.
5. To encourage creative expression.
6. To develop a certain amount of skill in a number of basic industrial processes.[8]

Industrial Arts in General Education. A closer look at the objectives as stated will reveal the similarity of these objectives and those of general education. General

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[8] Gordon O. Wilber, Industrial Arts in General Education, pp. 42-43.

education has as its purposes: (1) the transmission of a way of life, (2) the improving of the emergent culture, and, (3) the meeting of individual needs.[9] Training for future participation in a democracy is transmitting a way of life and in the shop classroom students are given the opportunity to plan and organize the activity. Improving emergent culture is done through critical, purposeful thinking. In the shop, this type of thinking is more easily stimulated because the students think in terms of concrete materials. Industrial arts, perhaps more than any other course, helps to meet the basic needs of the individual for it provides activity, a chance for participation, preparation for life work and development of desirable social traits.

Industrial Arts in Vocational Education. Students have been noted to have a basic need to feel growth toward a position of economic independence and a place in the vocational scheme of life. Industrial arts helps to meet this need by providing opportunities in which some of the important occupational fields may be sampled. No attempt is made to provide vocational skills. But the student is impressed by the introduction to the tools and processes of industry and by the opportunity to study and select from the trades and occupations of adult society.

D. THE APPLICATION OF THIS PHILOSOPHY

The Need in the Separate Schools. In the separate

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[9] Wilber, op. cit., p. 3.

school curriculum, a program designed to achieve the objectives discussed would be of immeasurable value. At the present time, there is a need of expanded facilities and of broader curricula. With the limited program now in use, there is little chance to offer a wide range of selectivity in the occupational skills. This sometimes prevents students from making a wise choice. A broader curriculum and expanded facilities will allow for fuller participation and will aid in the realization of the democratic ideal in shop training.

Objectives of Industrial Arts in the Separate Schools. In addition to the general objectives previously designated for industrial arts, there are others especially suitable for the separate school program. In this program, the students often depend entirely on the high school shop training to fit them for a vocation. The separate school programs should have added objectives as follows: (1) to keep pace with changing community needs and to translate these needs into a comprehensive program of shop instruction, and, (2) to arrange shop training so that the greatest amount of needed instruction can be offered with the equipment and facilities already available.

Conclusion. The purpose of this chapter has been to define industrial arts and its related terms. The place of industrial arts in general education has been discussed to justify industrial arts in the school curriculum. The next chapter is devoted to the history of industrial arts in Negro schools.

CHAPTER III

THE HISTORICAL BACKGROUND

In the development of modern European civilization, serfdom was doomed in those places where men began to work in the mechanic arts and where the rough work of the domestic system was abandoned for the factory system. New conditions of life and liberty came to millions of men. As the craftsmen grew in number and the guilds grew in power, the serfs slowly disappeared. Where serfdom did not give way to the new day, the violence of revolution resulted. This change marked the division between the civilization of the past and of the present.[1]

A. INDUSTRIAL HISTORY OF NEGROES IN AMERICA

Foundations of Industrial History. At the close of the Civil War, it did not escape the attention of some thoughtful persons in the South that there were problems to be solved and adjustments to be made between masters and ex-slaves. These persons felt that training the slave as an artisan and a mechanic would unfit him for slavery. One of these persons expressed his opinion in these words:

> Wherever slavery has decayed, the first step in the progress of emancipation has been the elevation of the slave to the rank of artisans. . .This is the process through slavery has receded as mechanic arts have advanced.[2]

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[1] Carter G. Woodson, Negro Professional Man and the Community, pp. 214-215.

[2] Charles Wesley, Negro Labor in the United States, p. 21.

Decline of Slave Labor. This process was fundamentally true in the life of the individual Negro who lived in the medievalism of the South and it may be noticed in the Free-Negro Group in the decade prior to the Civil War. In urban and rural communities where slavery existed, slave mechanics were leaders in Negro life. Some slaves purchased their liberty and fled from slavery to freedom and hired themselves out. Others remained to be hired by their masters on a more advantageous basis. Use of free labor was urged by southern statesmen and this served to intensify the demands for slaves. Political consideration was involved in the movement as was economic demands. But in spite of the efforts of all, slave labor had about run its course in American history and the movement for free labor was winning its way.

Steps Taken by Race Groups. In Rochester, New York, on July 6, 1853, a large and important convention was held. It was proposed there that an industrial school be established for Negroes. Other conventions were held from time to time and similar sentiments expressed. In conventions and lodge organizations, the free Negro population endeavored to indicate the advancement in mechanical pursuits which was held necessary to the full development of the race group. These efforts of the Negroes to secure benefits of education and of useful occupations were highly praised.[3]

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3 Woodson, op. cit., p. 221.

Need of Industrial Schools Foreseen. The problem of industrial education for Negroes was by no means an after-the-war consideration. About 1848, a manual labor school was established near Newport, Indiana. A charter was received from the state and the school was known as the Union Literary Institute. In 1852, the suggestion was made that a manual labor school should be opened to give southern Negroes the opportunity to prepare themselves in some mechanical field. During the next year, Frederick Douglass, the great Negro educator, drew up a plan for an industrial college in which should be taught several important branches of the mechanical arts. In this plan, Mr. Douglass asserted that Negroes must find new employment and learn new trades. He said:

> Members of the race must build houses as well as live in them--make as well as use furniture--construct bridges as well as pass over them. We need workers in iron, clay and leather. To live here as we ought, we must fasten ourselves to our countrymen through their everyday cardinal wants.[4]

Thus, Frederick Douglass saw prophetically the need which was stressed later by Booker T. Washington and which found a practical expression in the establishment of Tuskegee Institute.

The Rise of the Industrial School. From 1870 to 1890, the South underwent a transformation. An industrial South took the place of the agricultural South. These new conditions made new demands on the worker. Untrained, discounted

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[4] Wesley, op. cit., pp. 60-61.

in efficiency, and proscribed by their employers and fellow workmen, the lot of the Negro, for a time, was to be cast with unskilled labor. In order to aid Negroes in adjusting themselves more readily to skilled labor conditions, there arose the industrial school, the idea of which had appeared prior to the Civil War. The majority of these schools aimed at giving the freedmen intellectual and moral freedom. For this reason, the development of industrial schools was slow.

The Founding of Hampton Institute. Hampton Institute was the first industrial school for Negroes of any considerable influence founded after the Civil. It was founded in 1868 by General Samuel Chapman Howard, a man who had foreseen the need for an educational institution specifically adapted to the need of the ex-slave.[5] General Howard said his purpose in founding Hampton was:

> To train selected negro youths who would go out and teach and lead their people, first by example, by getting land and homes, to give them not a dollar that they could not earn themselves, to teach respect for labor, to replace stupid drudgery with skilled hands and to these ends, build up an industrial system for the sake not only of self-support and intelligent labor but also for the sake of character.[6]

Tuskegee Institute. A second influence in the movement for industrial training for Negroes was the work of Booker T. Washington, who came to Hampton in 1872. After graduation,

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[5] Charles A. Bennett, History of Manual and Industrial Education from 1870 to 1917, p. 244.

[6] Ibid., p. 245.

he taught for several years and in 1881 became the principal of Tuskegee Institute. Under his leadership, this school became the great exponent and Mr. Washington the great advocator of industrial education for Negroes in America.[7]

A Period of Transition. The decade from 1910 to 1920 was epochal in the industrial history of the Negro people. Even with strongest effort, improvements were obtained in earlier years only with greatest difficulty. From 1910-1920, alterations were effected by the momentum of the population drift. Thousands of Negroes left the South to seek better working conditions and higher wages in the industries of the North. The setting out of a people on so stupendous a venture has provided them with experiences which may serve as a point by which may be charted a course for the future. It may well be that it will carry the Negro forward to a position where he will be able to make his greatest contribution to the national, social, economic and cultural life of America. At the same time, the race will receive as compensation, those things that will make for their greatest advancement in accordance with their fondest ambitions, all of which will be moulded by experience.[8]

B. INDUSTRIAL EDUCATION FOR NEGROES IN OKLAHOMA

The Origin of Separate Schools in Oklahoma. Records of

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7 Wesley, op. cit., p. 220.

8 Dean Dutcher, The Negro in Modern Industrial History, p. 23.

Negro schools in Oklahoma from 1890 to 1907 are incomplete. It is known that the first territorial legislature set aside land for the support of the schools, a small per cent of which went for the support of Negro schools. An act of Congress passed on June 28, 1898, known as the Curtis Act provided for the establishment of public schools in the incorporated towns of the Indian territory. Separate schools were designated as "those schools in said district of the race having the fewest number of children".[9] First to take advantage of this provision was Muskogee and in 1899, a two-story frame building was erected to serve as the colored school.

Industrial Arts Born of Need. Shortly after the opening of the fall term in the Muskogee separate school, the building was dedicated to school use and was named Dunbar in honor of the noted Negro poet, Paul Lawrence Dunbar. In recognition of this honor, Mr. Dunbar donated a full set of his literary productions, both poetry and prose. The donation of these books caused a campaign to be started to establish a school library and many useful books were added until a splendid collection was acquired. This gave rise to the need of a bookcase in which to keep the books. Within a few weeks after the book campaign took place, a bookcase was made by the boys of the school under the direction of the principal. Thus, the first manual training department had its beginning there.

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9 Holtzclaw, op. cit. p. 40-41.

Soon the department branched out to repair furniture, frame pictures, and make household trinkets to get money with which to buy materials and supplies for the shop. Within a few years, this department was able to pay the expenses for its operation and had won several premiums on projects sent by it to the World's Fair at St. Louis.

The Rise and Support of the Separate Schools. Negro schools grew slowly because of the problem of financing them. These schools had to be supported by a levy of the excise board. In counties where Negroes comprise a considerable per cent of the population, the question of finance is a grave one. An example is Wagoner County with 22 separate schools and a 2-mill tax levy to support them.[10] In certain instances, state aid and contributions of various foundations were called on to make up the difference. One of these, the John F. Slater fund, contributes to the salaries of teachers in certain counties provided the curricula are designed to prepare Negroes to make decent livings and to train pupils teach in Negro schools.

The Anna Jeanes Foundation is another of these organizations which has helped to promote growth of Negro schools. This foundation contributes one-half the salary of industrial supervisors who work among Negroes under the control and direction of the county superintendent. The county in which

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[10] Nathaniel J. Washington, Historical Development of the Negro in Oklahoma, p. 61.

the supervisors work agree to pay the other half of the salary. The teachers under the Jeanes Plan introduced some simple forms of industrial arts into Negro schools.

The Establishment of Langston University. Langston University was the first institution of higher education for Negroes to be established in the state. It was created by an act of the Territorial Legislature in 1897. The citizens of the community of Langston donated the site and the school opened on September 14, 1898. The students who resided at the school did all the work in the dormitories and much of the work in the dining hall. Each student was required to spend at least one and one-half hours per day in some handicraft. Much interest was shown in the fields of agricultural and vocational education.[11]

Vocational Education in Separate Schools. State funds for vocational education were made available for use in the separate schools under the Smith-Hughes Act (1917) and the George-Deen Act (1937). Under the provisions of these acts, state funds were to be supplemented by federal funds and a portion of these funds was to be alloted to Negro schools on the basis of number of students enrolled in vocational education courses. The practicality of this knowledge was held to be especially important in an agricultural state.

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[11] Washington, op. cit., pp. 64-65.

Vocational education became a regular part of the school program in 1929 under the provisions of the Smith-Hughes Act.[12] Oklahoma has since set an example for all other states in the equitable distribution of federal funds between the race groups in all phases of vocational education.[13]

Present Status of Negro Education in Oklahoma. The growth of the separate school in Oklahoma has been quite remarkable in the last two decades. By 1940-41, Negro school attendance had increased from a mere handful at the outset to 54,621 and there were 66 accredited high schools in the state. This was an increase of more than 50 in the decade from 1930 to 1940.[14] The establishment of a Division of Transportation in the state caused funds to be available for the transportation of Negro students. Transportation made possible one strong high school to serve a large area. This has resulted in increased enrollment, better buildings, more competent teachers, more and better equipment and more desirable recreational and vocational units. The number of Negro high schools accredited by the North Central Association has increased from 6 to 11 in the last year. Langston University received the approval of that body in 1948.

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12 "Oklahoma State Plans for Vocational Education," p. 3.

13 Journal of Negro Education, p. 309.

14 Holtzclaw, op. cit., p. 14.

All this has added prestige to the realm of Negro education in Oklahoma. Higher education in all fields is being made available to Negroes within the state. Until recently, it was necessary for Negro students to go outside the state for graduate and professional training. Expanded facilities, highly trained teachers and administrators, and higher standards of achievement make for an encouraging outlook in the field of Negro education in Oklahoma.

CHAPTER IV

THE SURVEY

Before a program could be planned for the separate high school shops, it was necessary to obtain certain information from the shops now in existence. As was stated in Chapter I, this information was obtained by questionnaire. A three-page questionnaire was prepared. These questionnaires were mimeographed for mailing. A list of the separate high schools which have industrial arts included in their curricula was obtained from the Directory of Teachers and Administrators of Industrial Education in Oklahoma Secondary Schools, Colleges and Universities for 1949-50, prepared by Oklahoma Agricultural and Mechanical College at Stillwater.

Distribution of the Questionnaire. These questionnaires were mailed to fifty separate high schools. Each was accompanied by a personal letter explaining the purpose of the survey. A copy of the questionnaire, the letter of accompaniment, and the follow-up letter are to be found in Appendix B of this writing. Twenty-two answers of one kind or another were received at the start. Later, a follow-up letter was mailed to each principal who had made no reply. Eight additional replies were received. This made a total of thirty answers. Table I shows the high schools to which questionnaires were mailed. Those from which no answers

TABLE I

SEPARATE HIGH SCHOOLS IN OKLAHOMA WHICH OFFER INDUSTRIAL ARTS

*Lincoln High School	Altus
Lincoln High School	Anardarko
Dunbar High School	Arcadia
Douglass High School	Ardmore
*Dunbar High School	Atoka
*Douglass High School	Bartlesville
Wheatley High School	Beggs
*Boley High School	Boley
Lincoln High School	Bristow
Lincoln High School	Chickasha
Excelsior High School	Clinton
Booker T. Washington High School	Cushing
Douglass High School	Duncan
Booker T. Washington High School	El Reno
Booker T. Washington High School	Enid
Booker T. Washington High School	Eufaula
Faver High School	Guthrie
*Colored High School	Hartshorne
*Grayson High School	Hoffman
*Booker T. Washington High School	Idabel
*Lewisville High School	Kinta
*Douglass High School	Kingfisher
Douglass High School	Lawton
Douglass High School	Lenapah
*Booker T. Washington High School	Luther
Manual Training High School	Muskogee
*Lincoln High School	Nowata
Douglass High School	Oklahoma City
Dunbar High School	Okmulgee
Grayson High School	Okmulgee
*Booker T. Washington High School	Pawhuska
*Lincoln High School	Pawnee
Blaine High School	Perry
Attucks High School	Ponca City
*Miller High School	Red Bird
Rentiesville High School	Rentiesville
Booker T. Washington High School	Sand Springs
Booker T. Washington High School	Sapulpa
*Booker T. Washington High School	Seminole
*Dunbar High School	Shawnee
*Douglass High School	Spiro
Washington High School	Stillwater
Moton High School	Taft
*Booker T. Washington High School	Tishomingo
Woodson High School	Tullahassee
Booker T. Washington High School	Tulsa
*Douglass High School	Vian
*Dunbar High School	Wellston
Douglass High School	Wewoka
*Lincoln High School	Wynnewood

were received are indicated by asterisks.

Data About Separate Schools. Some explanation is perhaps necessary to account for the small number of answers used in the tables. The writer learned through interview with certain shop instructors that teachers in the smaller shops are often reluctant to reveal the incompleteness of equipment in their shops. It is believed that the sending of the questionnaire to the school principal rather than to the shop teacher had some bearing on the lack of response. The writer did this for two reasons. First, a more complete and accurate list of principals was found to be available in the state high school bulletins. Second, principals were thought to have more time and interest to devote to such matters.

Of the thirty replies received, one was from a high school whose industrial arts program was not sufficiently organized or equipped to be included in the survey. One reply requested additional forms. These were mailed immediately and no further reply was received. Two were from schools expressing regret over failure to complete the form. The reasons given were: (1) loss of the form, and (2) oversight on the part of the teacher. Twenty-six questionnaires were answered more or less completely and twenty schools did not reply. The data contained in this chapter are based on compilations resulting from analysis and interpretation of the twenty-six questionnaires.

The Questionnaire. The purpose of this study was to determine the type of program now in existence in separate school shops in Oklahoma. The questionnaire was divided into five parts: (1) the shop; (2) teaching schedule; (3) curriculum; (4) training of teachers; and, (5) equipment.

The first page of the questionnaire consists of questions about the shop size and location, and teaching methods, techniques and aids. A table is included on which the teaching schedule is to be listed. The second page contains additional questions on teaching methods, a table to show the training of shop teachers, and a check list for listing shop equipment. The third page is a continuation of the check list on page two. The remainder of this chapter is devoted to a discussion of the data as compiled from the information contained in the questionnaire.

The Shop. The total number of high schools used in Table II is twenty-six. Of this number, twelve are a part of the main building, twelve had separate buildings and two did not answer. Twenty-two of these shops were located on the first floor, two were located in the basement and two did not locate the shop. Gas stoves were used to heat fifteen of the shops, ten used other types of heating systems and one did not answer. The average size of the shops was: length forty-eight feet, width thirty-one feet and height twelve feet. This gives an average floor space of 1488 square feet.

Teaching Schedule. Fifteen of the shops in the survey offer woodwork as a part of shop training. Eleven others offer variations of the same subject but list it as general shop, wood-turning, pattern-making, manual training and industrial arts. Table II shows the number of shops offering each of the courses listed. Course listings were taken from answers given in the questionnaire. The greatest number of students, 510, are enrolled in woodworking classes. The third column of Table II shows the number of hours per day that these shops are open for instruction in the subjects listed. For the woodworking courses, the texts listed were Hand Woodworking, by DeWitt Hunt; Principles of Woodworking, by Herman Hjorth; and, Units in Hand Woodworking, by Douglass and Roberts.

Curriculum. "Does the shop have a library?" To this question, 19 replied "yes". Six said "no". One did not reply. Of the nineteen shops with libraries, the number of books ranged from six to one hundred.

"What visual aids are used?" The answers received indicate that 16-millimeter movie projectors are used in fourteen shops. These projectors are used to show films dealing with woods and furniture design. Slide projectors are used in four shop classrooms. Three shops that have no projectors list standard woodworking charts, posters and blackboard illustrations as visual aids. Eight shops use no visual aids and two did not reply to the question.

TABLE II

STUDENT ENROLLMENT IN SHOP COURSES

Type of Course	No. of boys	No. of shops	No. of hrs. per day
Woodwork	510	14	36
Shop	211	5	16
Industrial Arts	165	6	13
Woodwork and Drawing	55	2	4
Machine Woodwork	49	2	2
Mechanical Drawing	48	5	5
Manual Training	23	1	2
Mechanics	22	1	1
Pattern-Making	15	1	1
Tool Care	13	1	1
Small Wood Projects	11	1	1
Wood Turning	9	1	1
Total Number of Boys	1149		

To the question dealing with the method used to assign projects, fifteen replied that the students are given free choice in selecting projects. Two answered that the projects were assigned by the instructors. Nine answered that both methods were used with projects being assigned by the teacher in the lower grades and chosen by the students in the upper grades. Various comments were made on this question. One instructor finds that allowing students to choose their own projects stimulates interest in the work. Another lets the students carry out any project that they can draw, work out a bill of material, and for which they are able to pay. And a third instructor allows free choice only if the project meets home needs.

"Is the course designed for general education? Vocational education? Or both?" Eleven shop teachers answered that the courses taught were designed for general education. One replied that the course was designed for vocational education. Fourteen have courses designed for both.

When asked to indicate the methods used for teaching shop classes, twenty-one indicated the lecture method, twenty-four use demonstrations, twenty use class discussion and fourteen use question and answer. Of these numbers, twelve teachers were found to use all four methods. The fourteen others use one, two or three of the methods suggested.

"How is student achievement measured?" This question brought a variety of responses. One instructor stated that the amount of work done, and the skill used in doing the job

were used as standards of measurement. Five teachers listed skill of performance as a measure of achievement. Eleven use tests as a form of measurement. Other qualities listed were: independence of individual action, apparent progress, speed, accuracy working adaptability, measuring up to a pre-determined standard, tool manipulation and quality of finished product.

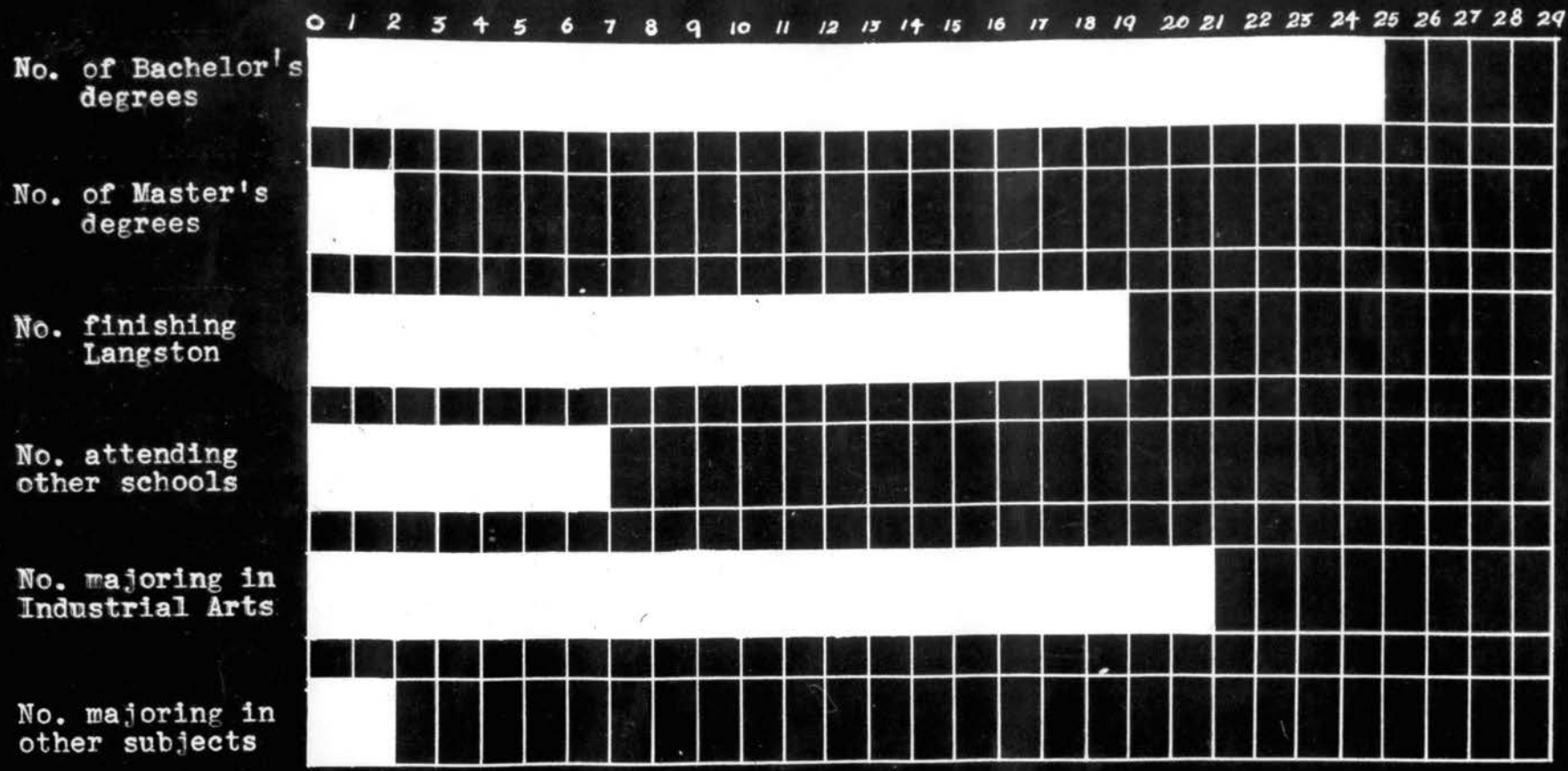
The next question asked that the teachers indicate whether or not job sheets, work sheets and course outlines were used. Eight teachers indicated the use of job sheets in their work. Eight indicated the use of work sheets. Course outlines were used by fifteen of the instructors. One respondent did not indicate the use of either of the three and no respondent used all three.

"Are unit tests given? Final examinations?" Fourteen teachers replied "yes" to the question on unit tests. On final examinations, twenty-four replied "yes". One teacher answered "no" to both parts of the question.

"Does the shop program meet local needs?" Seventeen felt that their programs did meet local needs. Seven said the program in use did not. One answered, "To an extent". When asked how this was determined, two answered by community survey. One answered by parent satisfaction. One replied by student's ability to adjust himself. Another replied by students gaining knowledge of building trades through experience. Still another said by attitudes, practical use and vocation. Three of the respondents who

TABLE III

TRAINING OF INDUSTRIAL ARTS TEACHERS IN SEPARATE SCHOOLS IN OKLAHOMA



answered "yes" failed to give the reason for this answer. Of the seven who replied "no", one based his determination on what the students do after leaving school. Another felt that the boys received insufficient vocational training. And another based his reply on a comparison of the training the students are receiving with that they should receive. Two gave no basis for this answer. The respondent who replied, "To an extent", said that the whole community needed vocational guidance.

Training of Industrial Arts Teachers. Twenty-nine teachers were listed in the twenty-six questionnaires. Of these, twenty-five have the degree of Bachelor of Arts only. Nineteen of these are from Langston University. Two hold Master of Arts degrees and two others failed to reply. Other schools attended were Iowa State University, Kansas State Teacher's College, Tuskegee Institute, Colorado State College of Education, and Lincoln University. Other information concerning the training of industrial arts teachers will be found in Table III.

Equipment. The equipment in the schools from which answers were received varied according to the size of the shops and the amount of work done. (Table IV) Since woodwork, in one form or another, was the only one of the courses listed in the questionnaire that was taught in all the shops, most of the equipment listed was in the woodwork department. The band saw was the machine found most often

TABLE IV EQUIPMENT IN SEPARATE SCHOOL SHOPS

Name of Machines	No. of Machines	Average Size	No. of Shops
Variety Saw	9	8"	9
Universal Saw	11	10"	11
Band Saw	22	16"	20
Jig Saw	14	6"	13
Jointer	20	8"	20
Drill Press	13	½" capacity	13
Shaper	6	18" table	6
Surfacer	3	24"	3
Belt Sander	5	small	3
Glue Pot	13	1 qt.	3
Power Grinder	14	8"	12
Saw Filing Machine	3	36"	3
Wood-turning Lathe	26	36"	21
Benches	143	22x33x52	25
Mortiser	6	½" capacity	6
Portable Sander	14	12"	12
Drawing Boards	177	22x30	13
T-Squares	179	26"	17
Stools	52	26"	5
Drawing Tables	60	31x36	9
Drawing Sets	73	10 pcs.	9
Radio	2	small	1
Telephone	2	regular	2
Blow Torch	9	regular	9
Transformer	1	8 volt	1
Electric Meter	1	small	1
Electric Motor	6	¼ h. p.	3
Angle Brace	1		1
Honing Device	2	No. 3	2
Battery Charger	4	medium	2
Storage Battery	3	6 volts	1
Auto Jacks	7	2½x4x10	3
Universal Testing Machine	2	regular	2
Forming Roll	1		1
Bar Roll	1		1
Beading Machine	2		1
Burring Machine	-		-
Turning Machine	3	16"	1
Hollow Mandrel	1	No. 3	1
Soldering Furnace	2	small	1
Squaring Shears	3	8"	2
Pneumatic Riveter	1	small	1
Plain Brake	3	medium	2
Leather Hand Tool Sets	3		2
Wood Carving Sets	5		4
Buffing Wheel	3	6"	2
Potter's Wheel	3	10"	2
Bench Grinder	9	small	9
Vibro-Tool	1	small	1

in the shops. The wood-turning lathe and the jointer were next in incidence. One shop had all new equipment as this was the first year for the teaching of industrial arts in that school. Only one shop had equipment for teaching the five courses listed in the check list. One shop had only a bench grinder and a jig saw. When asked to list additional equipment, nine shops listed bench grinders and one listed a vibro-tool.

Letters Received. In three cases the questionnaires were not returned but letters of explanation were received. All of these furnished reasons for the failure to complete the questionnaire. One other letter accompanied a completed form and expressed the writer's desire to be informed of the survey findings. This invitation was extended to all in the letter of transmittal which accompanied the questionnaire but only one such reply was received.

Summary. In answer to the questionnaire, thirty replies were received. Of these, twenty-six answered the questionnaire more or less completely. Four others answered but did not complete the form.

The number of students enrolled in high school shop classes ranged from three to one hundred twenty-six. Since the size of the schools varied so greatly, it was to be expected that the shop program would reflect this difference.

It is evident from the answers that industrial arts as it is taught in the schools in the survey will prepare

students to perform minor repair tasks and to build small articles. The task of training students in some skill which would prepare him for competition in industry is lacking in accomplishment. This may be accounted for by the limitations placed on the programs being offered by lack of equipment and inadequacy of facilities. In most communities, boys who have had training in a specific skill find employment easier to get.

About half the answers received show that industrial arts does not receive sufficient stress in the schools. This is borne out by the fact that the average time allowed for industrial arts is only a little more than two hours per day. This lack of stress is perhaps due to lack of equipment and overloaded teaching schedules in the smaller schools. Woodwork shops range from one shop equipped with a jig saw and a bench grinder to a shop with equipment for teaching the five basic industrial arts courses. Most shops were small and poorly equipped. And all need equipment of one kind or another in most departments.

Having completed the tabulation and interpretation of the data secured by the use of the questionnaire, the writer will undertake the proposal of a program for the separate schools of Oklahoma. This plan will be Chapter V of this study.

CHAPTER V

THE PROPOSED INDUSTRIAL ARTS PROGRAM FOR THE SEPARATE SCHOOLS OF OKLAHOMA

In this chapter the proposed program of activities for the general school shop will be considered. The type of training included in this program will be determined by local conditions, by the writer's experiences in industrial arts training, and by the data obtained from the survey.

In formulating this program, it is to be remembered that industrial arts is an essential part of general education. It was conceived as an answer to the problem of educating boys to live in a world which may be accurately characterized as industrial and technological.[1]

Shop Training. In the proposed program for the separate schools, the training begins when the boys enter junior high school. The first two years are to be devoted to general training in all units of the proposed courses. Upon completion of the two years of general training, each boy with the guidance of the instructor will elect the unit of his choice. During the remainder of his stay in high school the student will be given specific training under actual working conditions in his chosen field. This is not a program of trade training, but rather an exploratory course designed to expose the student to the fundamental objectives

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1 Wilber, op. cit., p. 1.

of industrial arts and thus to bring out his hidden skills and knowledges.

It is further proposed that during the first training period in the school shop, one hour each day should be spent in shop classwork. It is recommended that two hours each day be spent in industrial arts subjects for the advanced classes.

The Courses of Study. The course of study is designed to be of benefit to both student and instructor. It is to be used as a progress chart. When the student has completed one assignment, it will be presented for the approval of the instructor and that unit will be checked off in the space at the right of the course outline. The courses of study are taken from the bulletin, Improving Instruction in Industrial Arts, published by the American Vocational Association Committee, Homer J. Smith, Chairman. These courses of study are presented in outline form.

Course of Study in Woodwork. Every shop program should include woodwork in its curriculum for woodworking is one of the basic shop courses, and it offers training which is useful in almost any line of work that the student might pursue. One would not expect the shop training program to train boys qualified to fill positions as skilled cabinet makers or carpenters, but one should expect boys to receive general training in the use of various machines and tools which would be of benefit to the student whether or not he chooses to follow woodworking as an occupation.

Woodworking courses have commonly been too narrow in school shops. The experiences provided have given contact with a sufficient variety of materials and exploratory experiences have not always been made available. The following program is proposed to meet these requirements.

A. Things pupils should learn to do.

1. Read a working drawing . . . . . ____
2. Make out a bill of material. . . . . ____
3. Plan the procedure in doing jobs . . . . . ____
4. Check materials when received. . . . . ____
5. Measure and divide spaces with a rule. . . . . ____
6. Lay out a pattern on stock . . . . . ____
7. Check the layout . . . . . ____
8. Lay out curves with dividers or compass. . . . . ____
9. Divide spaces with dividers. . . . . ____
10. Gage with pencil and with marking gage . . . . . ____
11. Test for squareness with the try-square. . . . . ____
12. Lay out square cuts with the try-square. . . . . ____
13. Adjust a jack-plane or a smooth-plane. . . . . ____
14. Plane a surface true and plane an end-grain. . . ____
15. Plane an edge square with an adjoining surface . ____
16. Proceed properly in squaring up a board. . . . . ____
17. Saw to a line with a cross-cut, rip or back-saw. ____
18. Saw inside or outside curves with a coping-saw . ____
19. Round edges. . . . . ____
20. Finish outside and inside curves . . . . . ____
21. Drill holes in wood. . . . . ____
22. Countersink holes. . . . . ____
23. Bore holes with an auger-bit . . . . . ____
24. Fasten with screws . . . . . ____
25. Trim or pare with a chisel . . . . . ____
26. Smooth surfaces with chisel and with scraper . . ____
27. Shape ends, edges and curves with wood-file. . . ____
28. Drive and draw nails . . . . . ____
29. Set a nail or brad . . . . . ____
30. Lay out and test cuts with sliding T-bevel . . . ____
31. Round or form work with a spokeshave . . . . . ____
32. Lay out an octagon and a chamfer . . . . . ____
33. Hold stock with handscrews and clamps. . . . . ____
34. Apply stain, wax and enamel. . . . . ____
35. Clean and care for stain and shellac brushes . . ____
36. Apply fillers and shellac. . . . . ____
37. Transfer a design. . . . . ____
38. Make a butt-joint. . . . . ____

39. Lay out an irregular design by means of squares. _____
40. Sharpen edge tools . . . . . _____
41. Keep tools free from rust. . . . . _____
42. Adjust a block-plane . . . . . _____
43. Cut curves with a compass saw. . . . . _____
44. Apply stain for a two-tone effect. . . . . _____
45. Prepare glue . . . . . _____
46. Glue up work . . . . . _____
47. Apply paint with brush . . . . . _____
48. Clean and care for paint brushes . . . . . _____
49. Lay out duplicate parts. . . . . _____
50. Make a notch joint and a half-lap joint. . . . . _____
51. Lay out and cut a dado and a cross-lap joint . . _____
52. Cut a groove and a rabbet. . . . . _____
53. Make an edge-to-edge joint . . . . . _____
54. Lay out and cut tapers . . . . . _____
55. Do upholstering that involves simple padding . . _____
56. Dress a screwdriver. . . . . _____
57. Set and use an expansive-bit . . . . . _____
58. Cut curves with a turning-saw. . . . . _____
59. Lay out an ellipse . . . . . _____
60. Put on locks and drawer pulls. . . . . _____
61. Put on hinges and ball-catches . . . . . _____
62. Apply varnish. . . . . _____
63. Apply lacquer. . . . . _____
64. Clean and care for varnish and lacquer brushes . _____
65. Apply finish with a spray gun. . . . . _____
66. Lay out and cut a miter joint. . . . . _____
67. Construct a panel. . . . . _____
68. Make a splined joint . . . . . _____
69. Make a drawer-slide. . . . . _____
70. Fasten on a table top. . . . . _____
71. Fasten with lag-screws . . . . . _____
72. Cut an edge mold . . . . . _____
73. Sharpen auger-bits, scrapers and saws. . . . . _____
74. Use a Forstner bit . . . . . _____
75. Clean and care for a spray gun . . . . . _____
76. Lay out and cut a housed joint . . . . . _____
77. Lay out and cut a blind mortise-and-tenon joint. _____
78. Lay out and cut a through mortise-and-tenon joint. . . . . _____
79. Lay out and cut a haunched mortise-and-tenon joint. . . . . _____
80. Give a fumed-oak finish. . . . . _____
81. Do simple upholstery that involves use of springs. . . . . _____
82. Do simple upholstery that involves webbing and rolled edges . . . . . _____

B. Things Pupils Should Know.

1. Identify the following kinds of lumber and other kinds

of lumber in common use in the community; the pines, spruce, cypress, oak, walnut, birch, maple, poplar, mahogany, red cedar, hickory, gum and chestnut . ____

2. The principal characteristics of lumber, the working qualities, principal uses, and the sources of supply. . . . . ____
3. The methods of cutting and milling lumber. . . . ____
4. How lumber is dried, effect of moisture. . . . . ____
5. Standard dimensions of lumber and how classified ____
6. The nominal and actual dimensions of lumber. . . ____
7. How veneers and plywood are made, their uses . . ____
8. The object of finishes . . . . . ____
9. Kinds of finishes in common use, such as stain, oil, wax, shellac, varnish, enamel and paints. ____
10. The durability of the different finishes . . . . ____
11. The conditions or places in which various kinds of finishes may be used. . . . . ____
12. Materials from which finishes are made . . . . . ____
13. Kinds of glue, and preparation of same . . . . . ____
14. Conditions and requirements of uses of glue. . . ____
15. Kinds of nails and their uses. . . . . ____
16. Size of nails and how nails are sold . . . . . ____
17. Kinds of screws and their use. . . . . ____
18. How sizes and kinds of screws are indicated. . . ____
19. Kinds, grades and principal uses of sandpaper. . ____
20. Grades and uses of steel-wool. . . . . ____
21. Develop fair judgment concerning the design of furniture with regard to the following: Is it adapted to the use for which it is intended? Is it structurally good? Is it well made? Are the structural members in good proportion? Does it have an appearance of stability? Is the structure well and appropriately finished? . . . . . ____
23. The locations of important manufacturing concerns ____
24. The division of labor. . . . . ____
25. The use of automatic machinery . . . . . ____
26. Types of joints, where used and why. . . . . ____
27. Types of hinges and their uses . . . . . ____
28. Types of latches and where used. . . . . ____
29. Types of locks and where used. . . . . ____
30. Special types of fittings. . . . . ____
31. Kinds of grinding and sharpening stones, their grades and uses. . . . . ____
32. Opportunities and requirements in carpentry and other woodworking trades . . . . . ____

Course of Study in Electrical Work. The industrial arts work should not be organized with the view of preparing pupils for specific electrical vocations. The time available should be spent in giving them a broad understanding of electrical

theory through the use of carefully selected projects.

The field of electricity is so vast, and its applications in practice so extensive and so intricate, that only a small part of it can be considered in listing units for the purposes of teaching. There are, however, certain fundamental conceptions and practical phases that may be presented with profit to pupils of high school ages. To go beyond these would suggest specialized vocational training.

A. Things Pupils Should Learn to Do.

1. Read a wiring diagram. . . . . ____
2. Make a wiring diagram. . . . . ____
3. Plan a procedure for doing a job . . . . . ____
4. Make a rat-tail splice . . . . . ____
5. Make a Western Union splice. . . . . ____
6. Make a tap splice. . . . . ____
7. Remove insulation or covering from wire. . . . . ____
8. Solder and tape a splice . . . . . ____
9. Attach wire to a binding post. . . . . ____
10. Uncoil wire without twisting . . . . . ____
11. Connect dry-cells in series and in parallel. . . ____
12. Plan and construct a simple electric circuit . . ____
13. Plan and install electric devices in a circuit in series and in parallel. . . . . ____
14. Plan and construct circuits to give selective control of devices in the circuit. . . . . ____
15. Attach a cord to a lamp-socket . . . . . ____
16. Attach a cord to a plug. . . . . ____
17. Test and replace fuses . . . . . ____
18. Read an electric meter . . . . . ____
19. Interpret the identity marks on a motor. . . . . ____
20. Administer first aid in case of shock. . . . . ____
21. Attach a terminal to a wire. . . . . ____
22. Provide a "make and break" in a circuit. . . . . ____
23. Apply the principle of electro-magnetic force in order to operate mechanisms as in a buzzer . . ____
24. Employ resistance to generate heat . . . . . ____
25. Reduce voltage on a line . . . . . ____
26. Locate a break in a circuit. . . . . ____
27. Tie an underwriter's knot. . . . . ____
28. Calculate the resistance of a circuit. . . . . ____
29. Install a snap-switch, flush-switch and flush-receptacle . . . . . ____
30. Measure voltage and amperage . . . . . ____
31. Wire a circuit so as to prevent a dangerous rise in temperature, due to resistance. . . . . ____

B. Things Pupils Should Know.

1. Properties of the magnet and characteristics of the magnetic field . . . . . ____
2. Source of electric current or pressure . . . . . ____
3. The characteristics of the electric current. . . ____
4. How electric current is conveyed . . . . . ____
5. The kinds of conductors and their uses . . . . . ____
6. The meaning of volt, ampere and watt . . . . . ____
7. How electric current gives power, light and heat ____
8. The difference between direct and alternating current. . . . . ____
9. Sources of direct and alternating current. . . . ____
10. The meaning of phase and cycle . . . . . ____
11. The meaning of "series" and "parallel" and the difference between the effects of these connections. . . . . ____
12. Resistance and its effect. . . . . ____
13. Ohm's law. . . . . ____
14. How the electric bell works. . . . . ____
15. Why splices should be soldered . . . . . ____
16. The importance of proper insulation. . . . . ____
17. The sizes of wire. . . . . ____
18. The effect of an overload. . . . . ____
19. Symbols used in wiring diagrams. . . . . ____
20. Safety rules in working with electricity . . . . ____
21. How the rheostat, volt-meter and ammeter work. . ____
22. Construction and operation of the wet and dry cell battery . . . . . ____
23. Kinds of fuses and their uses. . . . . ____
24. How the electric meter works . . . . . ____

Course of Study in Automobile Mechanics. The automobile is perhaps more widely used than any other machine. For this reason, it is important that people know something of the principles upon which it operates in order that it may be used with greater satisfaction. If people are to be taught to use and care for automobiles intelligently, the instruction must be specific and systematic. The shop equipment used for this instruction must be sufficient and of proper character.

The list of learning units given here is not a list of the repairs a boy should be able to make, but a list of the

experiences he should have in order that he may understand some of the fundamental principles of machines, how to care for machines and how to make minor repairs and adjustments.

A. Things Pupils Should Learn To Do.

1. Plan the procedure in doing a job. . . . . ____
2. Test and clean spark-plugs . . . . . ____
3. Clean and adjust breaker points. . . . . ____
4. Grease a car and change oil in the engine. . . . ____
5. Wash and polish a car. . . . . ____
6. Clean gasoline lines . . . . . ____
7. Replace light bulbs. . . . . ____
8. Remove sediment from the radiator. . . . . ____
9. Test and care for the battery. . . . . ____
10. Remove and replace a tire. . . . . ____
11. Adjust tension on a fan or generator belt. . . . ____
12. Repair punctures with hot and cold patches . . . ____
13. Insert a boot in a casing. . . . . ____
14. Grind valves . . . . . ____
15. Trace lines of power from engine to wheel. . . . ____
16. Adjust the charging rate in a generator. . . . . ____
17. Clean the commutator . . . . . ____
18. Iron out dents or bends in fenders or body . . . ____
19. Retouch scratches or damage to the finish. . . . ____
20. Align the front wheel. . . . . ____
21. Adjust mechanical brakes . . . . . ____
22. Trace lines of power from battery to engine. . . ____
23. Trace lines of power from engine to generator. . ____
24. Trace lines of power from engine to distributor. ____
25. Trace electric circuit from generator to battery ____
26. Inspect a vacuum tank and a fuel pump. . . . . ____
27. Trace and test the lighting system . . . . . ____
28. Test, focus and adjust lights. . . . . ____
29. Inspect and adjust front wheel bearing . . . . . ____
30. Test for and correct lost motion in steering mechanism. . . . . ____
31. Inspect and adjust clutch and differential . . . ____
32. Adjust hydraulic brakes and main bearings. . . . ____
33. Adjust connecting rod bearings . . . . . ____
34. Scrape a bearing . . . . . ____
35. Clean and adjust the carburetor. . . . . ____
36. Trace and test the ignition system . . . . . ____
37. Locate and repair a short or open circuit. . . . ____
38. Test an ignition coil. . . . . ____
39. Time valves. . . . . ____
40. Adjust valve clearances in L-head and valve-in-head engines . . . . . ____

B. Things Pupils Should Know.

1. Types and uses of anti-friction bearings . . . . ____
2. What is meant by camber, caster, and toe-in and how they affect car operation. . . . . ____
3. Principle of the worm-gear and how applied to steering gear. . . . . ____
4. How the cam-and-lever type of steering gear works. . . . . ____
5. The different types of brakes and axles. . . . . ____
6. Types of engine bearings and reasons for use . . ____
7. Kinds of pistons and types of rings. . . . . ____
8. How the fuel pump works. . . . . ____
9. Purpose of the carburetor and how it works . . . ____
10. Necessity and method of proper lubrication . . . ____
11. Safety precautions of driving. . . . . ____
12. Types of clutches and how they work. . . . . ____
13. The universal joint and how it works . . . . . ____
14. How the gear-shift transmission works. . . . . ____
15. How the free wheeling device works . . . . . ____
16. How the differential works . . . . . ____
17. Meaning of gear ratio and effect on power and speed. . . . . ____
18. How fluid drive works. . . . . ____
19. How starting, lighting and ignition systems work ____
20. How the over-drive mechanism works . . . . . ____
21. The meaning of cycle in a gas engine . . . . . ____
22. How the gas pump works . . . . . ____

Course of Study in General Metalwork. The manipulative processes of general metalwork consist mainly of cutting, shaping, forming and jointing thin metals with hand tools or any work with metals that may be manipulated while cold. Metalwork is more difficult than certain other kinds of school shopwork, and the average student cannot work with metals with the same freedom that he uses with other materials. So few schools have facilities for offering this course that its introduction into this proposal may prove controversial. But the writer feels that this type activity will prove useful in meeting the objectives of this course if effective methods are employed in teaching.

A. Things Pupils Should Learn To Do.

1. Make out a bill of material. . . . . ____
2. Check material when received . . . . . ____
3. Plan the procedure for doing a job . . . . . ____
4. Transfer patterns to sheet metal . . . . . ____
5. Cut with tinner's snips. . . . . ____
6. Solder tin, copper, brass and galvanized iron. . ____
7. Sweat and rivet joints . . . . . ____
8. Light and operate a blow-torch . . . . . ____
9. Trim with squaring shears. . . . . ____
10. Form by hand and with bar folder . . . . . ____
11. Turn edges for a hem . . . . . ____
12. Hold a curved edge . . . . . ____
13. Punch holes with solid and hollow punch. . . . . ____
14. Raise or bump sheet metal forms. . . . . ____
15. Roll a sheet on a forming machine. . . . . ____
16. Wire edges on a wiring machine . . . . . ____
17. Wire edges with a bar-folder and a hammer. . . . ____
18. Turn a lock seam . . . . . ____
19. Groove with a hand groover . . . . . ____
20. Burr with a machine. . . . . ____
21. Make a setting-down seam on a machine. . . . . ____
22. Double seam at bottom. . . . . ____
23. Use the square stake and the hatchet in forming. ____
24. Drill holes in metal . . . . . ____
25. Use a cold-chisel and a hand-swage . . . . . ____
26. Stretch metal with hammer for flange or joint. . ____
27. Braze with hard solder . . . . . ____
28. Prepare cut acid flux. . . . . ____
29. Anneal with copper or brass. . . . . ____
30. Give hammer finish to copper, brass or iron. . . ____
31. Apply lacquer finish . . . . . ____
32. Color and etch on copper or brass. . . . . ____
33. Clean copper with acid . . . . . ____
34. Use a file, hack-saw, and taps and dies. . . . . ____
35. Bend, twist, and form wire . . . . . ____
36. Bend, twist, and form strap-iron . . . . . ____
37. Develop patterns . . . . . ____
38. Lay out patterns for scrolls . . . . . ____
39. Bend bars or strap-iron into scrolls . . . . . ____
40. Drill with a power drill . . . . . ____
41. Twist iron bars for ornamental shapes. . . . . ____
42. Give a durable black finish. . . . . ____
43. Cut threads and tap holes. . . . . ____
44. Draw out hot metal . . . . . ____
45. Temper small tools . . . . . ____
46. Tin a soldering-copper . . . . . ____

B. Things Pupils Should Know.

1. The kinds of solder and their uses . . . . . ____

2. Kinds and uses of fluxes and dipping solutions . ____
3. Names of tools, equipment and operations in a general metal shop . . . . . ____
4. How to care for tools and equipment. . . . . ____
5. How to identify kinds of metal . . . . . ____
6. The gages of sheet-metal . . . . . ____
7. The standard sizes of soft iron wire . . . . . ____
8. Sources and characteristics of tin . . . . . ____
9. Methods of manufacturing tin-plate . . . . . ____
10. Commercial sizes of tin-plate. . . . . ____
11. The manufacture of galvanized iron, its grades and qualities. . . . . ____
12. Sources, uses, and characteristics of copper . . ____
13. Composition, characteristics and uses of brass . ____
14. Sources, characteristics and uses of zinc and aluminum . . . . . ____
15. The principal kinds of steel . . . . . ____
16. The manufacture of steel . . . . . ____
17. Kinds and sizes of drills and rivets . . . . . ____
18. How to specify grades of tin-plate and galvanized iron . . . . . ____
19. Occupational information . . . . . ____

Course of Study in Mechanical Drawing. The term "mechanical drawing" is applied to work involving the use of instruments as differentiated from "freehand" drawing. Mechanical drawing involves relatively few manipulative skills, but it requires a high degree of proficiency in these skills in order that the drawings produced may be of good appearance. The manipulative phase of drawing is the skillful rendering of the solutions of problems. Such skills can be acquired only through careful and painstaking practice. These skills must be accompanied by the knowledge and ability to solve problems to be of greatest benefit.

A. Things Pupils Should Learn To Do.

1. Fasten drawing paper on drawing board. . . . . ____
2. Sharpen drawing pencils. . . . . ____
3. Measure with the scale . . . . . ____
4. Mark points with a pencil. . . . . ____
5. Choose the necessary views of an object. . . . . ____

6. Sketch lines and make a working sheet. . . . . ____
7. Draw vertical and horizontal lines . . . . . ____
8. Draw parallel lines. . . . . ____
9. Clean and care for drawing instruments . . . . . ____
10. Keep drawing and drawing table neat. . . . . ____
11. Draw, and know uses of, different kinds of lines ____
12. Erase pencil lines . . . . . ____
13. Block out views. . . . . ____
14. Make front, top and side views with a knowledge of their relationship. . . . . ____
15. Pencil a drawing in correct order. . . . . ____
16. Draw views with hidden edges . . . . . ____
17. Dimension a drawing. . . . . ____
18. Sharpen and adjust a compass lead. . . . . ____
19. Draw arcs and circles. . . . . ____
20. Make arrow heads. . . . . ____
21. Make numerals and lay out a title. . . . . ____
22. Letter upper-case letters. . . . . ____
23. Make a drawing to scale and check. . . . . ____
24. Draw sectional views of an object. . . . . ____
25. Make an auxiliary view . . . . . ____
26. Letter notes and specifications. . . . . ____
27. Transfer measurements. . . . . ____
28. Divide a line into a given number of equal parts ____
29. Draw floor-plans, octagons, hexagons, simple graphs, machine parts, ellipses, and irregular curves . . . . . ____
30. Ink straight lines . . . . . ____
31. Ink arc and circles. . . . . ____
32. Ink a drawing in proper order. . . . . ____
33. Erase an ink line or an ink spot . . . . . ____
34. Make a blueprint . . . . . ____
35. Measure with outside and inside caliphers. . . . ____
36. Bisect arcs and angles . . . . . ____
37. Draw bolts with conventional threads . . . . . ____
38. Dress dividers, ruling pens and compass pens. . . ____
39. Make a detail drawing. . . . . ____
40. Make an assembly drawing . . . . . ____
41. Make a tracing on cloth and on paper . . . . . ____
42. Determine the true length of a line. . . . . ____
43. Draw the development of square, prism-shaped objects. . . . . ____
44. Make isometric and oblique drawings. . . . . ____

B. <u>Things Pupils Should Know</u>.

1. Kinds of scales used in measuring and for what class of work each is used . . . . . ____
2. Names and uses of drafting instruments and how to care for them . . . . . ____
3. Sizes of triangles and T-squares and how designated . . . . . ____

4. How to select and care for a drawing board . . . ____
5. How to arrange lighting to protect the eyes. . . ____
6. Kinds and qualities of drawing paper . . . . . ____
7. Various kinds of pens and their uses . . . . . ____
8. The kind of ink used in drafting . . . . . ____
9. How to select and test T-squares and triangles . ____
10. Qualities and uses of tracing paper and tracing cloth. . . . . ____
11. How to select and care for blueprint paper . . . ____
12. Kinds of pens best suited for lettering. . . . . ____
13. Conventional ways of representing breaks in materials. . . . . ____
14. Occupational information, including success factors, income and opportunities. . . . . ____
15. How to read contour maps . . . . . ____

CHAPTER VI

THE SHOP BUILDING AND EQUIPMENT

Survey findings, observation of industrial shops in the separate schools of the state, and interviews with Mr. E. A. Miller, Head of the Industrial Arts Department at Langston University, have revealed to the writer inadequacies which are outstanding in certain features of the industrial arts programs in the separate schools. These factors have been taken into consideration in planning the shop building and in listing the equipment.

The Shop as it Now Exists. At this time, the separate school shops, in many instances, are too small to accommodate suitable programs. In many cases, the shop is a part of the main building and is equipped to house a woodworking program only. So few machines are provided for this purpose that it is doubtful that the program being used will meet state requirements. The average shop is equipped with one band saw, one jig saw, one drill press, one jointer, and one wood-turning lathe. Most of these are in fair or poor condition.

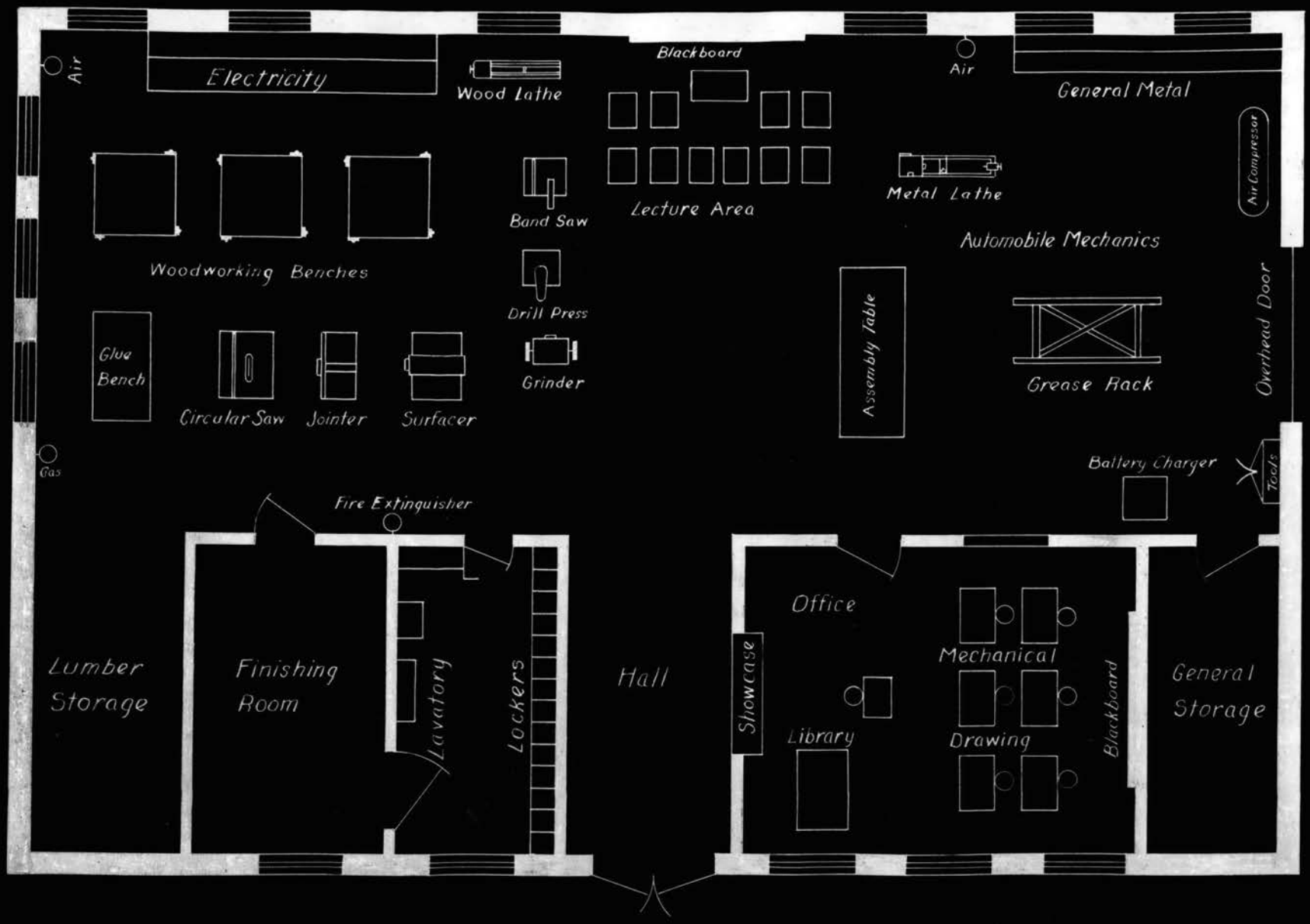
Specific Needs of the Separate School Shop. The separate school shop has a peculiar problem facing it in meeting the needs of the students. This problem concerns the two groups who look to the high school for training. One group will go on to college, the other will go into competitive

participation in jobs that are available. The school shop program must be based on job opportunities offered by the community in order to meet this need. These problems and others which were discussed in the first chapter of this writing have brought to the attention of the writer the need for a more complete industrial arts program for the separate schools. The writer offers suggestions for the solution of these problems in the form of a plan for a general shop and the equipment needed for its operation.

The Proposed Plan. The floor plan of the proposed general shop is shown on the next page. The shop is arranged to accommodate pupils from the eighth grade through the senior year of high school. In planning this shop, the writer had in mind the possibility of enlarging the industrial arts program.

This proposed shop includes facilities for teaching woodwork, mechanical drawing, electrical work, automobile mechanics, and general metalwork, with ample storage and locker space for each. On one side is the classroom in which the library is located. This classroom is equipped for showing pictures and slides related to the training program.

This shop is located in a building separate from the main building. This eliminates disturbances caused by shop noises in other classrooms and provides a more adequate means of lighting and ventilation. The aisles and danger areas in the shop are painted red for safety purposes. The walls


Air
Electricity
Wood Lathe
Blackboard
Air
General Metal
Air Compressor
Band Saw
Lecture Area
Metal Lathe
Automobile Mechanics
Woodworking Benches
Drill Press
Assembly Table
Overhead Door
Glue Bench
Grinder
Grease Rack
Circular Saw
Jointer
Surfacer
Gas
Battery Charger
Tools
Fire Extinguisher
Office
Lumber Storage
Finishing Room
Lavatory
Lockers
Hall
Showcase
Mechanical
Library
Drawing
Blackboard
General Storage

are painted a receding color to reduce the possibility of a glare. The machines are painted a color that will harmonize with the walls. All working surfaces are painted a light color to contrast with the work. All operating controls are painted a bright color, such as yellow, and all switches are painted red to promote safety. The floor is of concrete overlaid with hardwood in all departments except automobile mechanics.

Equipment Needed for Woodworking. The equipment listed for the woodworking course will include machines and tools which are necessary for work in cabinet-making, furniture repair, pattern-making and repair jobs in the home or community. The suggested equipment list was taken from the Industrial Arts and Vocational Education Magazine, for March, 1950.

Equipment

Shop benches with hardwood tops	4
Stain bench with metal covered top.	1
Glue benches.	1
Teacher's demonstration bench	1
Blackboard - Permanent or portable.	1
Book Case	1
Cabinets - Wood or steel, for filing.	2
Table Arm Chairs.	14
Teacher's Chair	1
Core Oven - For pattern-making class.	1
Teacher's Desk.	1
Furnace for melting soft metals	1
Glue Pot - 1 qt. or 2 qt., electric	1
Bench motor grinder	1
Revolving Oilstone.	1
Jointer - 6" or 8" portable	1
Jointer - 12", 16" or 18", direct motor drive	1
Lathes - Motor in head, motor in base or belt driven.	4
Pattern-maker's Lathe - End face plate provision.	1

Mortiser - Hollow chisel, foot feed	1
Planer - 18", 20", or 24", motor or belt driven	1
Sander - Belt, direct motor drive	1
Sander - Disk, motor or belt drive	1
Sander - Oscillating, motor driven	1
Sander - Portable, hand-plane type, direct motor drive	1
Band Saw - 20" to 36", table tilt 45°	1
Cut-off Saw - Pedestal or swing type	1
Jig Saw - Direct or motor driven	1
Universal Bench Saw	1
Variety Bench Saw	1
Portable Shaper - With selection of cutters	1
Vises - Rapid action, woodwork bench type, 7" to 10"	6
Drill Press - 10", floor type, motor drive	1
Braces - Ratchet type, 8"	2
Bit Set - Auger, 3/16" to 1"	1
Counter Sink	1
Dowel - Square shank	1
Expansion Bit - 7/8" to 1½"	1
Expansion Bit - 7/8" to 3"	1
Screw-driver - Square shank	2
Brushes - Bench duster, 10"	8
Brushes - Glue, round, ½"	2
Brushes - Varnish, flowing, 2"	6
Brushes - Varnish, flat, 1"	8
Brushes - Camel hair, sign painter	2
Chisel Wood - ¼", ½", 1", each	1
Doweling Jig	1
Hand Drill - 0" to ½"	1
Plane - Block, 6", 1 5/8" cutter	2
Plane - Fore, 18", 2 3/8" cutter	1
Plane - Jack, 14", 2" cutter	4
Plane - Combination	1
Oilstone - Medium, fine, each	1
Nail Sets - Assorted	3
Level - Wood, 12"	1
Files - Cabinet, 10"	1
Emery Wheel Dresser - With extra cutters	1
Bit Gauge	1
Saw Set - Circular	1
Scraper - Cabinet	1
Spoke Shave - Adjustable, 10"	1
Screw-driver - Cabinet-maker's, 6" and 8", each	4
Squares - Combination, 12"	2
Squares - Try, 8"	6
Squares - Framing, 16" x 24"	2
Squares - Tee, bevel, 10"	1
Saws - Back, 12"	2
Saws - Coping, frames 6"	4
Saw Blades - Coping, 6", dozen	2
Saws - Hand rip, 6 point, 26"	1
Saws - Cross cut, hand, 9 point	1

Saws - Hack, 10"	1
Saws - Miter box, 4" x 18"	1
Pistol Grip Hand Saw Set	1
Pistol Grip Circular Saw Set	1
Yankee Automatic Drill - With bits	1
Monkey Wrench - 10"	1
Soldering Copper - (1lb.)	1
Marking Gauge	4
Rule - 2 ft. bench, graduated by 8ths and 16ths	4
Mallets - Hickory, 3" x 5", head	6
Pliers - Round nose, 6"	3
Steel Rule - 1 foot	2
Calipers - 6" outside	2
Calipers - 6" inside	1
Dividers - Wing, 8"	1
Draw Knife - 8"	1
Dado Head - 6"	1
Moulding Cutter Set	1
Hammers - Bell-faced, nail, 10 oz.	4
Hammers - 12 oz.	1
Glass Cutter	1
Putty Knife	1
Oil Can - ½ pint, copper	4
Carving Tool Set - (6 tools)	1
First Aid Cabinet and Supplies	1
Tape Line - 50 foot, steel	1
Clamps - Bar, 36" adjustable	4
Waste Can - For finishing	1
Vise - Anvil face, 4" jaw	1

Books on Woodworking

Douglass, J. H., and Roberts, R. H. Units in Hand Woodworking. Wichita, Kansas: McCormick-Mathers Company, 1932, 103 pages.

Hunt, DeWitt. Hand Woodworking. Oklahoma City, Oklahoma: Harlow Publishing Company, 1948, 282 pages.

Hjorth, Herman. Principles of Woodworking. Milwaukee, Wisconsin: The Bruce Publishing Company, 1946, 445 pages.

Hjorth, Herman. Machine Woodworking. Scranton, Pennsylvania: International Textbook Company, 1948, 362 pages.

Klenke, William W. Furniture Joinery. Peoria, Illinois: The Manual Arts Press, 1943, 144 pages.

O'Hare, Eugene. How To Make Your Own Furniture. New York City: Harper Brothers, 1941, 94 pages.

Wilber, Gordon O. Industrial Arts in General Education. Scranton, Pennsylvania: International Textbook Company, 1948, 362 pages.

The Industrial Arts and Vocational Education Magazine. Milwaukee, Wisconsin: The Bruce Publishing Company.

Equipment Needed for Electrical Work. The equipment listed for the electrical working course will include tools sufficient for the operations such as splicing wires, removing insulation, soldering, connecting to binding posts, insulating, together with certain standards of constructional methods.

Equipment

Bench Grinder	1
Benches - Plain or with drawers for tools and equipment	2
Bits - Auger, ¼" to 1" by 16ths, sets	1
Bits - Auger, 11/16", 18" long	1
Bits - Drill, square shank, 1/8" to ½" by 16ths, sets	1
Bits - Expansion	1
Bits - Expansion, 18"	1
Bits - Screw-driver, ¼"	1
Blackboard - Permanent or portable	1
Bookcase	1
Braces - Ratchet type, 8" swing	4
Bulletin Board	1
Cabinets - Wood or metal for filing	1
Chairs - Teacher's	1
Compass Saw	3
Coil - Spreader	1
Coil - Taper	1
Coil - Winder	1
Desk - Teacher's, with drawer compartment	1
Drill - Breast	1
Drill - Concrete, 3/8", ½", 3/4", 1"	1
Drill - Portable, electric	1
Drill - Twist, 1/32" to 3/8" by 32nds	1
Drill Press - Bench, hand or power driven	1
Files - Mill bastard, flat, doz	1
Drill Press - Heavy, power driven	1
First Aid Cabinet and Supplies	1
Hack Saw Blades - 10", 24 teeth, doz	2
Hack Saw Frames - Adjustable	6
Hammers - Claw, 12 oz	3
Hammers - Machinist, ball peen	6
Lathe - Engine, 10" or 12", swing	1
Pliers - Gas, 6½" and 8"	2
Pliers - Side cutting, 6"	2
Punch - For metal molding	1
Punches - Assorted (sets)	1
Reamers - Pipe burring, ¼" to 1"	1
Reamers - Pipe burring, ½" to 2"	1
Rules - Zigzag, 48"	4
Rules - Zigzag, 72"	4

Screw-drivers - 3", 5" and 8", each	3
Shears - For cutting metal molding	3
Solder Dippers	2
Soldering Coppers - Assorted	5
Soldering Coppers - Electric	2
Soldering Coppers - Handles	10
Stocks and Dies - For pipe threads, ½" to 1", sets	1
Vises - Machinist's, 4"	6
Vises - Pipe	2
Wrenches - Adjustable, 6" and 8"	2
Wrenches - Pipe, 10", 12" and 14", each	1
Wrenches - Socket, combination, each (sets)	2

Books on Electricity

Collings, Merle D. Projects in Electricity. Bloomington, Illinois: McKnight and McKnight, 1941, 80 pages.

Collins, Archie Fred. Fun With Electricity. New York City: D. Appleton Company, 1936, 238 pages.

Cook, Sherman. Electrical Things Boys Like to Make. Milwaukee: The Bruce Publishing Company, 1942, 205 pages.

Dragoo, A. W. and K. L. General Shop Electricity. Bloomington, Illinois: McKnight and McKnight, 1941, 124 pages.

Ford, Walter B. Electrical Projects for School and Home Workshop. Milwaukee: The Bruce Publishing Company, 1948, 168 pages.

Jones, E. W. Essentials of Applied Electricity. Milwaukee: The Bruce Publishing Company, 1935, 238 pages.

Lehmann, Herbert. Shop Projects in Electricity. New York City: American Book Company, 1934, 190 pages.

Morgan, Alfred. Things a Boy Can Do With Electricity. New York City: Scribner and Sons, 1938, 243 pages.

Perry, Edgar and Shafebrook, Harry. Fundamental Jobs in Electricity. New York City: McGraw-Hill Book Company, 1943, 447 pages.

Equipment Needed for Automobile Mechanics. The owner of an automobile should know something of the cause of common automobile failures and how to prevent them. This list of equipment for automobile mechanics courses in the schools will include tools and machines that are necessary for minor repairs and trouble-shooting of automobile engines. It will, also, give experiences which pupils should have in order

to understand the fundamental principles of the gasoline engine.

EQUIPMENT

Air Compressor - 3 to 4 cu. ft. with tank, piping and motor	1
Aligning Jig - For connecting rods.	1
Anvil - No. 100 or 125.	1
Anvil - Rim	2
Armature Growler and Tester	2
Axle Stands	8
Battery Equipment - Complete Unit	1
Bench - Electric Test, elaborate.	1
Bench - Electric Test, simple	1
Bench - Wood with vises	1
Blackboard.	1
Bookcase.	1
Brake - Adjusting stand	1
Brake - Band lining machine	1
Bulletin Board.	1
Cabinets - Wood or metal for bolts and supplies	1
Cabinets - Wood or metal for filing job sheets.	1
Chain Hoist - With overhead trolley and track	1
Chairs - Teacher's.	1
Crane - Portable.	1
Crank Shaft - Truing tool	1
Creepers.	7
Desk - Teacher's.	1
Drill - Breast.	2
Drill - Hand.	3
Drill - Electric, portable ½"	1
Drill - Electric, portable ¼"	1
Drill - Press, 21" with motor and chuck	1
Dynamometer - Electric.	1
Forge - With blower and tools	1
Furnaces - Gas.	2
Grinder - Cylinder with motor	1
Grinder - 8" with motor	1
Hones - Cylinder, sets.	2
Jacks - Lever, 1½ ton	3
Jacks - Floor roller.	2
Lathe - Metal	1
Press - Arbor, 30 tons.	1
Spray Painting Outfit	1
Valve Refacing Machine.	1
Vulcanizing - Electric steam for tube work.	1
Vulcanizing - Small, hand	6
Welding Outfit - Complete	1
Wheel Alignment - Gauge	2
Wheel Alignment - Test table.	2
Bolt Cutters - 24" and 36", each.	2

Calipers - 6" inside and outside, each.	2
Oil Cans - 1/3 pint	1
Cans - Gas, safety, 1 gal	2
Cans - 5 gal.	2
Cans - Waste.	3
Combination Squares	2
Dividers - 6" and 10"	2
Fire Extinguishers.	3
First Aid Cabinet and Supplies.	1
Gauges - Air Pressure	12
Gauges - Center	4
Gauges - Depth.	3
Gauges - Thickness.	3
Gauges - Thread	3
Glass Cutters	12
Goggles - Pairs	4
Grease Guns - Plain	6
Grease Guns - Pressure Type	1
Lamps - Extension with shields.	4
Lead Pot - Gas.	1
Micrometers - Outside, 0 to 1".	1
Micrometers - Outside, 2" to 3"	1
Micrometers - Outside, 3" to 4"	1
Micrometers - Inside, 1½" to 6"	1
Oilstones	6
Pliers - Combination, 6", pairs	3
Pliers - Flat nose.	3
Pliers - Round nose	6
Pullers - Bearing	2
Pullers - Gear.	2
Pullers - Wheel, hub type	2
Putty Knives	12
Tool Kits	5

Books on Automobile Mechanics

Automobile Facts and Figures. Automobile Manufacturers Association, monthly.

Crouse, William H. Automotive Mechanics. New York City: McGraw-Hill Book Company, 1946, 673 pages.

Dyke, Andrew. Automobile and Gasoline Engine. Chicago: Goodheart-Wilcox Company, 1940, 225 pages.

Fraser, Edward. Motor Vehicles and Their Engines. New York City: Van Nostrand Company, 1926, 434 pages.

Harper, Herbert. Automobile Shop Mechanics. New York City: Van Nostrand Company, 1928, 136 pages.

Judge, Arthur. Automobile and Aircraft Engines. London: McGraw-Hill Book Company, 1936, 900 pages.

Kuns, Ray Foster. Auto Mechanics. Milwaukee, Wisconsin: The Bruce Publishing Company, 1943, 343 pages.

Equipment Needed for General Metalwork. The equipment listed for the metalworking course in the school shop will include machines and tools which are necessary for work in sheet metal, ornamental iron, art copper and the like.

Equipment

Air Compressor	1
Anvil - 100 lb.	1
Arbor Press	1
Belt Lacer	1
Bench - Metal working	1
Blackboard - Portable	1
Blower - For furnace	1
Blow Torch - 1 pint size	1
Bookcase - For reference books	1
Boring Bar	1
Bearing Scraper	1
Bevel Protractor	2
Brooms and Floor Brushes	4
Cabinet - Filing	1
Calipers	3
Cans - Oil, 1/3 pt., 1 pt., and 10 gal. each	1
Chisels	3
Clamps	3
Cake Forks	2
Combination Squares	2
Countersinks - For metal	2
Cutters	2
Dividers	2
Drills - Assorted	20
Die-finding Machine	1
Dividing Head	1
File Cards	2
Files - Assorted	10
First Aid Cabinet and Supplies	1
Forge Tools - Sets	1
Gate Sticks	1
Gauges	5
Goggles - Pairs	2
Hack Saws	4
Hammers	2
Nibbling Machine	1
Pipe Cutter	1
Punches - Metal, hand or power	2
Soldering Copper	2
Steel Letters	2
Straightening Press	1
Surface Plates	3

Vises - Machinist, pipe 3
Welding Outfit - Acetylene and Electric, each 1
Wheel Dresser 2
Wrenches - Sets 2

Books on General Metalwork

Becker, William. Metalworking Made Easy. Milwaukee: The Bruce Publishing Company, 1942, 135 pages.
Bick, A. F. Artistic Metalwork. Milwaukee: The Bruce Publishing Company, 1940, 236 pages.
Dragoo, A. W. General Shop Metalwork. Bloomington, Illinois: McKnight and McKnight, 1939, 68 pages.
Hobbs, Douglas B. Working With Aluminum. Milwaukee: The Bruce Publishing Company, 1947, 126 pages.
Jones, Harry A. Metalwork for Grades 7, 8, 9. Milwaukee: The Bruce Publishing Company, 1939, 112 pages.
Kronquist, E. F., and Pelikan, A. G., Simple Metalwork. New York City: Studio Publications, 1940, 96 pages.
Tustison, F. E., and Kranzusch, Ray F. Metalwork Essentials. Milwaukee: The Bruce Publishing Company, 1936, 176 pages.

Equipment Needed for Mechanical Drawing. Mechanical drawing is a universal language by means of which the form, size, finish, color and construction of an object can be described accurately and clearly. The equipment listed will be of average and standard size for the purpose of teaching the students to construct drawings of projects to be made with all measurements and dimensions for the benefit of others who work from these drawings. This list will supply fourteen students.

Equipment

Drawing Tables. 14
Stools. 14
Cabinet - Wood or steel, for filing 1
Drawing Boards - 18" x 24". 14
T-squares - 18" blade 14

Drawing Sets	14
45° Triangles	14
30° x 60° Triangles	14
Lettering Triangles	14
Triangular Scale	14
Irregular Curve	14
Protractors	14
Drawing Pencils - F, 2H and 4H to 6H, each	14
Pencil Pointer - Sand paper pad, or file	14
Pencil Erasers - Dozen	6
Erasing Shields	14
Art Gum - Or other cleaning eraser, dozen	6
Pen Staffs - Dozen	2
Pen Points - Gillotts' 303, 404; Hunt's 512; Leonardt ball pointed 516F, dozen, each	2
Drawing Ink - Black, water-proof, bottles	14
Drawing Paper - Tracing paper or tracing cloth, pkgs.	14
Thumb Tacks - Drafting tape	14
Dusting Brushes	14
Arkansas Oil Stone - For sharpening ruling pans	1
Drop pen, detail pen, proportioned dividers, contour pin, beam compass, each	14
Pocket Knife	1
Slide Rule	14

Books on Mechanical Drawing

Ericson, Emanual E., and Soules, Roy L. Planning Your Home. Peoria, Illinois: Charles A. Bennett, Co., 1938, 176 pages.

French, Thomas and Svenson, Carl. Mechanical Drawing. New York City: McGraw-Hill Book Company, 1934, 206 pages.

French, Thomas. Mechanical Drawing. McGraw-Hill Book Co., New York City, 1940, 300 pages.

Frklund, V. C. and Kepler, F. R. General Drafting. Bloomington, Illinois: McKnight and McKnight, 1949, 160 pages.

Mattingly, E. H., and Scrogin, E. Applied Drawing and Design. Wichita, Kansas: McCormick-Mathers Company, 1940, 224 pages.

Walton, Ernest W. Forty Illustrations and How They Work. New York City: Watson Guptill Publishing Company, 1946, 318 pages.

CHAPTER VII

CONCLUSIONS AND RECOMMENDATIONS

This study is based on a survey of the separate high schools in the state of Oklahoma. The information gathered from the high schools which have industrial arts programs has been used to propose a program for these high schools. It is intended that this proposed program would meet the community needs by preparing students for available job opportunities as well as for college.

Before the returns from the survey were tabulated and the shop plan and program formulated, some time was spent in studying the specific problems facing the separate school shop. These problems, together with a history of the development of industrial arts education in the Negro schools in America and in Oklahoma, are presented in the first part of this thesis. This is presented as the historical and educational background of this work.

Conclusions Based on Returns from Survey. The industrial arts shops show a wide range of variation which is accounted for in some cases by the enrollment. Shops with large enrollments are better equipped than those with a smaller enrollment. The expansion of the industrial arts programs seems to depend on increased enrollment which will in turn mean availability of additional funds. Other conclusions based on survey returns are:

1. Woodwork in some form is taught in every shop.
2. The greatest number of students are enrolled in woodwork, general shopwork and industrial arts, in that order.
3. Most of the shop time is spent in making projects for home use.
4. Equipment varies with shop size and enrollment and no shop has all the equipment needed.
5. Most shop teachers use a variety of advanced teaching methods.
6. Most shop teachers believe the program in use meets community needs.
7. Quality of project and tests are most generally used as measures of achievement.
8. Shop programs are designed to encourage independence of thought and action.

Recommendations. In planning a program of industrial arts for the separate high schools, many other features both desirable and needed occurred to this writer. It was impossible for a number of reasons to include these in the present program. Rather, they are presented as recommendations which would add to the effectiveness of any industrial arts program now in use.

These recommendations are made with an eye to the future. It is to be hoped that soon most high school curricula will find encompassed:

A. Courses in saw-filing and silk-screen printing.

B. Additional training for terminal students in communities where Trade and Industrial education training is not available.

This would provide: (1) better preparation for a pupil in his chosen vocation, and (2) a chance for pupils to mature and experience before entering the competition of adult society.

APPENDICES

A. A SELECTED BIBLIOGRAPHY

B. LETTERS AND QUESTIONNAIRE

A SELECTED BIBLIOGRAPHY

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2. Bennett, Charles A. History of Manual and Industrial Education from 1870 to 1917. Peoria, Illinois: Manual Arts Press, 1937, 461 pages.

3. Bennett, Charles A. History of Manual and Industrial Education from 1870. Peoria, Illinois: Manual Arts Press, 1926, 566 pages.

4. Bollinger, J. W. Elementary Wrought Iron. Milwaukee, Wisconsin: The Bruce Publishing Company, 1930, 139 pages.

5. Bonser, F. G., and Mossman, Lois. Industrial Arts in Elementary Schools. New York City: The MacMillan Company, 1936, 491 pages.

6. Campbell, William Giles. A Form Book for Thesis Writing. Boston: Houghton-Mifflin Company, 1939, 123 pages.

7. Dutcher, Dean. The Negro in Modern Industrial History. Lancaster, Pa.: Lancaster Book Company, 1930, 137 pages.

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11. Improving Instruction in Industrial Arts. Washington, D. C.: American Vocational Association, Inc., 1948, 96 pages.

12. Industrial Arts and Vocational Education Magazine. Milwaukee, Wisconsin: 39:24A-58A, March, 1950.

13. Oklahoma State Plans for Vocational Education. Guthrie, Oklahoma: Cooperative Publishing Company, 1927-32.

14. Reeder, Ward G. How To Write a Thesis. Bloomington, Illinois: Public School Publishing Co., 1930, 216 pages.

15. Spencer, Herbert. Education: Intellectual, Moral and Physical. London: G. Mainwaring, 1861, 413 pages.

16. State High School Bulletin. State Department of Public Instruction, 1950.

17. Struck, F. Theodore. Vocational Education for a Changing World. New York City: John Wiley and Sons, 1945, 550 pages.

18. Journal of Negro Education. Washington, D. C.: 7:307, July, 1938.

19. Washington, Nathaniel Jason. Historical Development of the Negro in Oklahoma. Tulsa: Dexter Publishing Company, 1948, 71 pages.

20. Wesley, Charles H. Negro Labor in the United States. Washington, D. C.: Howard University Press, 1926, 343 pages.

21. Wilber, Gordon O. Industrial Arts in General Education. Scranton, Pa.: International Textbook Company, 1948, 362 pages.

22. Woodson, Carter G. The Negro Professional Man and the Community. Washington, D. C.: Howard University Press, 1934, 365 pages.

23. Friese, John F. Course Making in Industrial Education. Peoria, Illinois: The Manual Arts Press, 1946, 214 pages.

APPENDIX B

LETTERS AND QUESTIONNAIRE USED IN THE INQUIRY

P. O. Box 267
Langston, Oklahoma

March 1, 1950

Dear Principal:

In accord with the requirements of the graduate school of Oklahoma Agricultural and Mechanical College, I am making a survey of the industrial arts programs in the separate schools of Oklahoma.

Recent trends have caused greater emphasis to be placed on the role industrial education plays in the educational plan of students. Industrial education is, indeed, gaining in prestige and importance.

It is my aim to gather information on the programs in effect in our schools at the present time and with this information to present a total picture of the nature and character of the programs in use. Without your cooperation, the picture will not be complete.

May I ask, then, that you fill out the enclosed questionnaire or delegate its execution to a responsible faculty member and return to me within the next few days. A self-addressed, stamped envelope is enclosed for your convenience.

I shall be happy to inform you of my findings. May I stress the importance of your cooperation and punctuality in making this survey complete.

Yours truly,

Approved:

Phail Wynn

Associate Professor,
Industrial Arts Education
Oklahoma A & M College

A SURVEY OF THE INDUSTRIAL EDUCATION PROGRAMS IN THE SEPARATE SCHOOLS OF OKLAHOMA IN 1950

Phail Wynn, Graduate Student
Department of Industrial Arts Education and Engineering Shopwork
Oklahoma Agricultural and Mechanical College
Stillwater, Oklahoma
Spring, 1950

Name of School_____City_____

Name of teacher_____

Name of shop or room_____

Size of room: Width_____, Length_____, Ceiling Ht._____

On what floor_____Part of main building_____

Type of heating system_____

TEACHING SCHEDULE

Period No.	Time (8-9)	Subject Taught	Grade Taught	No. in Class	Text Used

CURRICULUM

1. Does shop have a library?_____ Number of books_____
2. What visual aids are used? _____

   _____
3. Projects: Students have free choice_____, Assigned by Inst.__

   Comment_____
4. Is course designed for general education?_____

   Vocational education?_____ Or both?_____
5. Methods of teaching used: Lecture_____, Demonstration_____,

   Class discussion_____, Question and Answer_____.

6. How is student achievement measured?_____

7. Check if used: Job sheets_____, Work sheets_____, Course outlines_____.

8. Are unit tests given?_____, Final examinations?_____

9. Does the shop curriculum meet local needs?_____

How determined?_____

Training of Industrial Arts Teachers

Teacher	Degree Held	Yr. Recd.	Institution	Major

EQUIPMENT

In the following checklist, please give all the information requested for each item which is located in your shop. If you have equipment not listed in checklist, please list in space provided.

	Name	No.	Size	Condition
Woodworking	Variety Saw			
	Universal Saw			
	Band Saw			
	Jig Saw			
	Jointer			
	Drill Press			
	Shaper			
	Surfacer			
	Belt Sander			
	Glue Pot			
	Power Grinder			
	Saw Filing Machine			
	Wood-turning Lathe			
	Benches			
	Mortiser			
	Tenoner			
	Portable Sander			
Mech. Draw.	Drawing Boards			
	T-Squares			
	Stools			
	Drawing Tables			
	Drawing Sets			

	Name	No.	Size	Condition
Electrical Work	Radio			
	Telephone			
	Blow Torch			
	Transformer			
	Electric Meter			
	Electric Motor			
	Volt Meter			
	Angle Brace			
Auto Mech.	Hydraulic Lift			
	Honing Device			
	Battery Charger			
	Storage Batteries			
	Auto Jacks			
	Universal Testing Machine			
General Metalwork	Forming Roll			
	Bar Folder			
	Beading Machine			
	Burring Machine			
	Wiring Machine			
	Turning Machine			
	Hollow Mandrel			
	Stake Plate			
	Soldering Furnace			
	Squaring Shears			
	Pneumatic Riveter			
	Plain Brake			
	Pan Brake			
Arts and Crafts	Leather Hand Tools			
	Wood Carving Sets			
	Loom, Weaving			
	Etching Equipment			
	Buffing Wheel			
	Potter's Wheel			
	Kiln			
	Plastic Oven			
	Book Binding Equipment			
	Silk Screen Printing			

Date on which this questionnaire was filled out_____

Signature of teacher_____

Street or mailing address_____

P. O. Box 267
Langston, Oklahoma

April 1, 1950

Dear Principal:

May I call to your attention the questionnaire which I mailed to you some time ago? If it is at all possible, would you kindly complete this questionnaire and return it to me immediately as it is of value in the completion of the survey of Negro industrial education in Oklahoma.

For this favor, I shall be deeply grateful.

Yours truly,

Phail Wynn

Typist:

Valree F. Wynn

Langston, Oklahoma